

**MULTIMEDIA**



**UNIVERSITY**

**STUDENT ID NO**

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

**TRIMESTER 2, 2018/2019**

### **ECE3076 – DATABASE SYSTEMS**

(All Section / Groups)

15 MARCH 2019

9.00 A.M. – 11.00 A.M

(2 Hours)

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#### **INSTRUCTION TO STUDENTS**

1. This examination paper consists of five (5) printed pages including cover page containing four (4) questions only.
2. Answer all questions. All questions carry equal marks (25 marks each) and the distribution of marks for each sub-question is given. The total for this paper is 100 marks.
3. Please write all your answers in the Answer Booklet provided.

**Question 1**

You are given a database system for a room management database system for MMU Movies Sdn Bhd. The following relational schema is provided. Primary keys for each table are in **bold** and underlined.

Movie (**Movie ID**, Title, Runtime, Release)

Account(**Acc ID**, Name, Bill, Status)

Watchlist(**Item ID**, Movie\_ID, Acc\_ID, Completed)

Notes:

- Movie\_ID, Acc\_ID and Item\_ID are auto-incrementing INT(10).
- Title, Name, Status are VARCHAR(255).
- Bill is Decimal(6,2), runtime is INT(3) while Completed is INT(1).
- Release is type Date.

- a) Write an SQL command to create the table Watchlist with proper foreign key references. Deletions from the Movie are set to null while deletions for Account are set to cascade.

[7 marks]

- b) Write an SQL command to add the Decimal(6,2) field Price into the Movie table.

[2 marks]

- c) Write an SQL command to update all movies prior to 1 January 2018 to a starting price of RM1.99.

[2 marks]

- d) Write an SQL command to load data from 'c:\movie.txt' into the table movie.

[3 marks]

- e) Write an SQL to create a view called ChanAhBeng that displays the number of movies the customer Chan Ah Beng finished watching. The view should have three columns, Acc\_ID, Name and Movie\_Count where Movie\_Count counts the number of movies for the account with the name Chan Ah Beng that is completed (Completed=1).

[5 marks]

- f) Create a trigger free\_movie such that upon the insertion of a new record in Account, the trigger will insert the movie "Titanic" with ID 1273 into that new account's watchlist.

[6 marks]

**Continued...**

**Question 2**

You are tasked to design a database for a residential property development company. The following are their business rules:

- A salesperson manages several development projects, including *none* when first coming on board the company. A project has a maximum of 5 sales people managing it.
- A development project is comprised of several buildings. A building belongs to one and only one project.
- A building houses several units up to a maximum of 40 for high density residential projects. It may also have no units if it is a common area building like clubhouse or swimming pool. A unit belongs to only one building.
- Units are segregated into studio units, apartments and penthouses, and must belong to only one category.

- a) Using either Chen's OR Crow's foot notation, draw an ER diagram to represent the conceptual model for the database based on the rules above. You must indicate all possible connectivity and cardinality information in your diagram. Also include Extended ER notation wherever applicable.

[18 marks]

- b) Identify and resolve any M:N relationships found in the case study above by drawing an ER diagram for each resolved relationship. Remember to indicate all connectivity and cardinality information in the diagrams.

[7 marks]

**Continued...**

**Question 3**

- a) You are given the following Relation A with the primary keys underlined.

Relation A (Col1, Col2, Col3, Col4, Col5, Col6, Col7)

You also given the following functional dependency information indicated by->

[Example: ColX->ColY indicates that ColY's values are determined by ColX.]

- Col1->Col4, Col5
- Col2->Col3,
- Col6->Col7,
- Col1, Col2->Col6, Col7

- i) Draw the dependency diagram for Relation A with the corresponding partial and transitive dependencies correctly labeled.

[6 mark]

- ii) Show the steps to normalize Relation A to 2NF. Use the alphabetical order for names of the new relations created by this step.

[6 marks]

- iii) Show the steps to further normalize the solution of part (a)(ii) to 3NF.

[4 marks]

- b) Table 3(b)(i) and Table 3(b)(ii) represent the relations **Employee** and **Department** respectively. The corresponding **primary key** of each table is bold and underlined. **Dept ID** from Table 3(b)(i) references **Dept ID** from Table 3(b)(ii).

<b><u>Emp ID</u></b>	<b><u>Emp Name</u></b>	<b><u>Dept ID</u></b>
1	Cindy Khoo	NULL
1	Nelson Tan	A
2	Ahmad Rahman	D
3	Muthusamy	E
4	Mahmoud Sayid	D
5	Paul Dickson	NULL

**Table 3(b)(i): Employee**

<b><u>Dept ID</u></b>	<b><u>Dept Name</u></b>
A	Accounting
B	IT
C	Facilities
D	Legal

**Table 3(b)(ii): Department**

- i) Does Table 3(b)(i) satisfy entity integrity? Explain your answer.

[3 marks]

- ii) Does Table 3(b)(ii) satisfy entity integrity? Explain your answer.

[3 marks]

- iii) Does the relationship between Table 3(b)(i) and Table 3(b)(ii) satisfy referential integrity? Explain your answer.

[3 marks]

**Continued...**

**Question 4**

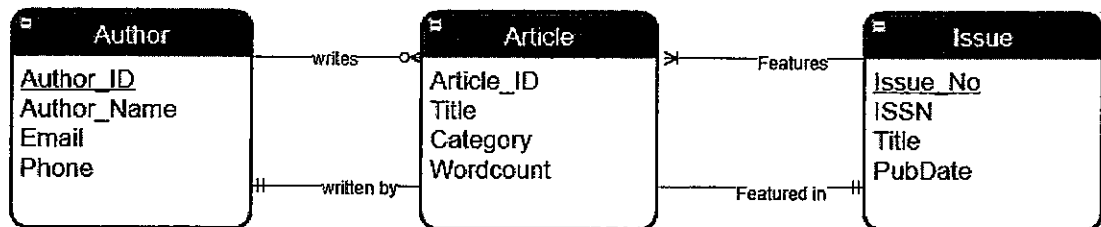
- a) The following table depicts a scenario with several transactions from different users and the data items locked and required by each transaction.

Transaction	Data Items Locked	Data Items Required
T1	X5,X17,X18	X3
T2	X1,X7	X8,X12
T3	X2,X10	X16
T4	X9,X12	X3,X8
T5	X3,X8,X16	X6
T6	X6,X11	X2
T7	X4,X10,X13	X2,X3
T8	X14,X15	X16

Draw a wait-for graph. Indicate the transactions that are causing the deadlock if any.

[5 marks]

- b) Convert the following Crow's Foot ERD into its object oriented UML equivalent representation.



[15 marks]

- c) In the wait/die scheme, an older transaction waits for locks to be released whereas a younger transaction will be rolled back and rescheduled using the same timestamp. Given the following scenario where T1 holds resources X1 and X2 while T2 holds resources X3 and X4. T1 needs X4 to complete while T2 needs X1 to complete. Assuming T1 is the older transaction and makes the request first for X4, describe in 5 steps how the above scenario is resolved using the wait/die scheme. Include details of the resources being held and released at each step in your description.

[5 marks]

**End of paper**